

● PRINTER RUSH ●

(PTO ASSISTANCE)

Application :

10/049,509

Examiner :

McCall

GAU :

2855

From:

KEM

Location:

IDC FMF FDC

Date:

12/8/05

Tracking #:

epm 10/049,509

Week Date:

8/29/05

DOC CODE	DOC DATE	MISCELLANEOUS
<input type="checkbox"/> 1449		<input type="checkbox"/> Continuing Data
<input type="checkbox"/> ID8		<input type="checkbox"/> Foreign Priority
<input checked="" type="checkbox"/> CLM	<u>6-15-05</u>	<input type="checkbox"/> Document Legibility
<input type="checkbox"/> IIFW		<input type="checkbox"/> Fees
<input type="checkbox"/> SRFW		<input type="checkbox"/> Other
<input type="checkbox"/> DRW		
<input type="checkbox"/> OATH		
<input type="checkbox"/> 312		
<input type="checkbox"/> SPEC		

[RUSH] MESSAGE:

① Most recent claim set is illegible. Please resolve.

Thank you

KEM

[XRUSH] RESPONSE:

See misc comm

Dave

INITIALS: [Signature]

NOTE: This form will be included as part of the official USPTO record, with the Response document coded as XRUSH.

REV 10/04



2100 Pennsylvania Avenue, NW
Washington, DC 20037-3213
T 202.293.7060
F 202.293.7860
www.sughrue.com

FAX

Date January 19, 2006

To Publishing Division

Of U.S. Patent and Trademark Office

Fax 703-308-6642

From Nataliya Dvorson Reg. No. 56,616

Subject RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Our Ref Q68269 Appln No 10/049,509

Conf No 4003 Inventors Hidetoshi YOKOTA, et al.

Pages 26 (including cover sheet)

Please call attention to problems with this transmission by return fax or telephone. Thank you.

THE INFORMATION CONTAINED IN THIS COMMUNICATION IS CONFIDENTIAL, MAY BE ATTORNEY-CLIENT PRIVILEGED, AND IS INTENDED ONLY FOR THE USE OF THE ADDRESSEE. UNAUTHORIZED USE, DISCLOSURE OR COPYING IS STRICTLY PROHIBITED AND MAY BE UNLAWFUL. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE IMMEDIATELY NOTIFY US.

This fax filing includes:

1. This cover sheet {one page}
2. Response To Notice To File Corrected Application Papers
(with claims section of Amendment under 37 C.F.R. § 1.111 filed June 15, 2005) {12 pages}
3. Copy of Notice to File Corrected Application Papers {13 pages}

CERTIFICATION OF FACSIMILE TRANSMISSION

Sir:

I hereby certify that the above identified correspondence is being facsimile transmitted to the Publishing Division of the USPTO on January 19, 2006 at facsimile no. 703-308-6642.

Respectfully submitted,



Nataliya Dvorson

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q68269

Hidetoshi YOKOTA, et al.

Appln. No.: 10/049,509

Group Art Unit: 2855

Confirmation No.: 4003

Examiner: Eric S. McCALL

Filed: June 07, 2002

For: METHOD FOR ESTIMATING VEHICULAR RUNNING STATE, VEHICULAR RUNNING
STATE ESTIMATING DEVICE, VEHICLE CONTROL DEVICE, AND TIRE WHEEL

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

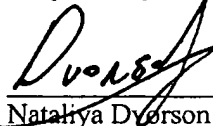
In response to the "Notice to File Corrected Application Papers-Notice of Allowance Mailed", mailed December 22, 2005, submitted herewith is a legible copy of the claims section of the Amendment filed on June 15, 2005. Applicant is only enclosing the pages of the Amendment which include the claims section as required by the Notice. Also, attached is a copy of the "Notice to File Corrected Application Papers - Notice of Allowance Mailed".

Consideration of the attached is respectfully requested.

No fee is believed to be necessary; however, if the USPTO disagrees, the USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880.

Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Nataliya Dverson

Registration No. 56,616

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

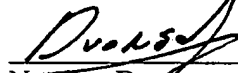
23373

CUSTOMER NUMBER

Date: January 19, 2006

Certificate of transmission

I hereby certify that this correspondence is being
facsimile transmitted to the Publishing Division of the
USPTO at Fax No. 703-308-6642 on January 19, 2006.



Nataliya Dverson

Registration No. 56,616

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (canceled).
2. (previously presented): A vehicle running state estimation method comprising:
detecting a vibration level of a portion below a spring of a running vehicle; and
estimating the running state of the vehicle by determining at least one of a condition of a road surface on which the vehicle is running and a running state of each tire,
wherein said determining is based on the detected vibration level, and wherein a waveform of time changes in the vibration level is detected and the condition of the road surface on which the vehicle is running is estimated from a vibration level at a predetermined position of the waveform or for a predetermined time range.
3. (currently amended): ~~The~~ A vehicle running state estimation method according to ~~claim 1, comprising:~~
detecting a vibration level of a portion below a spring of a running vehicle; wherein a frequency of the detected vibration level is analyzed to calculate a vibration level at a predetermined frequency band and a the degree of slipperiness condition of the road surface on which the vehicle is running is estimated from by comparing the calculated vibration level with a

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

master curve which is a vibration level detected through running on a road having a predetermined condition of a road surface of the running vehicle.

4. (currently amended): ~~The~~ A vehicle running state estimation method ~~according to claim 1, comprising:~~

detecting a vibration level of a portion below a spring of a running vehicle; and
estimating the running state of the vehicle by determining a degree of slipperiness of a road surface on which the vehicle is running and a running state of each tire,

wherein said determining is based on the detected vibration level, and

wherein the frequency of the detected vibration level is analyzed, at least two vibration levels at different frequency bands are calculated, an operation is carried out on the at least two calculated vibration levels, and the degree of slipperiness of the road surface is estimated from computed value.

5. (currently amended): ~~The~~ A vehicle running state estimation method comprising:

detecting a vibration level of a portion below a spring of a running vehicle; and
estimating the running state of the vehicle by determining a condition of a road surface on which the vehicle is running and a running state of each tire,

wherein said determining is based on the detected vibration level, and ~~according to claim~~

4,

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

wherein vibration levels of at least two points of a portion below the spring with a buffer member interposed therebetween are detected to calculate a vibration transmission level of the portion below the spring between the two points at a predetermined frequency band; and the ~~degree of slipperiness condition~~ of the road surface is estimated from the calculated vibration transmission level.

6. (previously presented): A vehicle running state estimation apparatus for estimating running state of a vehicle based on road surface conditions, the estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle;
means of computing waveform of time changes in the vibration level; and
road surface condition estimation means for estimating a condition of a road surface on which the vehicle is running from the vibration level at a predetermined position of the waveform or for a predetermined time range.

7. (previously presented): The vehicle running state estimation apparatus according to claim 6 further comprising means of calculating the vibration level of at least one of a tire leading edge portion, tire ground contact portion and tire trailing edge portion of the waveform.

8. (currently amended): A vehicle running state estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle;

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a ~~degree of slipperiness condition~~ of the road surface on which the vehicle is running ~~from~~ by comparing the calculated vibration level with the master curve which is the vibration level detected through running on a road having a predetermined road surface condition,

wherein the running state of the vehicle is estimated based on the ~~degree of slipperiness condition~~ of the road surface ~~received~~ from the road surface condition estimation means.

9. (previously presented): A vehicle running state estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle; and
road surface condition estimation means for estimating a degree of slipperiness of a road surface from a value obtained by carrying out an operation on at least two vibration levels at different frequency bands by analyzing the frequency of the detected vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means.

10. (currently amended): A vehicle running state estimation apparatus for estimating a running state of a vehicle based on a condition of a road surface comprising:

means of detecting vibration levels of at least two points on a portion below a spring of the running vehicle with a buffer member being interposed therebetween;

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

means of calculating a vibration transmission level at a predetermined frequency band between said at least two vibration detection points; and

road surface condition estimation means for estimating a ~~degree of slipperiness condition~~ of the road surface on which the vehicle is running from the calculated vibration transmission level.

11. (canceled).

12. (currently amended): ~~The~~ A vehicle running state estimation apparatus according to ~~claim 8, comprising:~~

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein a road surface friction coefficient μ at a time of running the vehicle is estimated based on a relationship between a surface friction coefficient μ obtained from braking distances of the vehicle under various road conditions at different speeds and at least one of the calculated

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

vibration level at said predetermined frequency band and a calculated vibration transmission level .

13. (currently amended): ~~The~~ A vehicle running state estimation apparatus according to ~~claim 8, comprising:~~

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein the frequency band is a band including frequency of natural vibration of a tire tread land portion.

14. (currently amended): ~~The~~ A vehicle running state estimation apparatus according to ~~claim 8, comprising:~~

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein a threshold value is set for the vibration level, and the surface of the road is estimated to be in a low friction condition when the calculated vibration level exceeds the threshold value.

15. (previously presented): The vehicle running state estimation apparatus according to claim 14, wherein the threshold value can be changed.

16. (previously presented): The vehicle running state estimation apparatus according to claim 6 which further comprises a vehicle speed detection means to estimate the condition of a road surface based on vehicle speed.

17. (previously presented): The vehicle running state estimation apparatus of claim 6, further comprising:

means of judging slipperiness of the road surface based on the condition of the road surface estimated by the road surface condition estimation means; and

warning means for giving a warning when it is judged that the condition of the road surface is slippery.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

18. (previously presented): The vehicle running state estimation apparatus according to claim 17, further comprising:

vehicle speed detection means to change decision on the slipperiness of the road surface and warning level based on vehicle speed.

19. - 24. (canceled).

25. (previously presented): The vehicle running state estimation apparatus according to claim 6, further comprising a transmitter for transmitting output of the vibration detection means for calculating a time change in the vibration level or a vibration level at a predetermined frequency band.

26. (previously presented): The vehicle running state estimation apparatus according to claim 6 further comprising a power generating unit mounted on a tire wheel, wherein the power generating unit generates power by rolling of each tire and supplies power for at least one of driving the vibration detection means and amplifying output of the vibration detection means.

27. (previously presented): A vehicle control apparatus comprising vehicle control means for controlling the running state of a vehicle based on the condition of the road surface estimated by the vehicle running state estimation apparatus of claim 6.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

28. (previously presented): The vehicle control apparatus according to claim 27 which comprises vehicle speed detection means to control the running state of the vehicle based on vehicle speed.

29. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls locked state of each wheel.

30. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls attitude of the vehicle.

31. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls air pressure of each tire.

32. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls idling state of each wheel.

33. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means changes inter-vehicle distance set value of an automatic driving system.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

34. (previously presented): A tire wheel comprising: the vehicle running state estimation apparatus for estimating a running state of the vehicle by detecting the vibration level of the portion below the spring as set forth in claim 6, and a power generating unit for generating power by a rolling of each tire and supplying power to the estimation apparatus.

35. (original): The tire wheel according to claim 34, wherein the vehicle running state estimation apparatus is mounted to the tire wheel.

36. (previously presented): The tire wheel according to claim 34, wherein the power generating unit comprises a rotor magnetized and rotated by the rolling of each tire, a stator made from a high magnetic permeability material and adjacent to the rotor and a power generating coil installed within a magnetic circuit including the rotor and the stator.

37. (original): The tire wheel according to claim 36, wherein the power generating unit comprises means of accumulating electromotive force generated in the power generating coil.

38. (previously presented): The tire wheel according to claim 36, wherein the rotor is turned by rotating an unbalance weight the gravity center of the rotary cone of which is eccentric to a rotary shaft by the rolling of each tire.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/049,509

39. (previously presented): The tire wheel according to claim 36, wherein an air stream generated by the rolling of each tire is introduced into the power generating unit and the rotor is turned by the introduced air stream.

40. (new): The vehicle running state estimation method according to claim 3, wherein the master curve is prepared based on the vibration level detected at the time when the vehicle is running on a surface of a road with a usual dry asphalt pavement.

41. (new): The vehicle state estimation apparatus according to claim 8, wherein the master curve is prepared based on the vibration level detected through the running on the surface of a usual road with dry asphalt pavement.



UNITED STATES PATENT AND TRADEMARK OFFICE

30 DAY

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22314-1450
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,509	06/07/2002	Hidetoshi Yokota	Q68269	4003

23373 7590 12/22/2005

SUGHRUE MION, PLLC
 2100 PENNSYLVANIA AVENUE, N.W.
 SUITE 800
 WASHINGTON, DC 20037

EXAMINER

MICHAEL ERIC SCOTT

ART UNIT PAPER NUMBER

2855

DATE MAILED: 12/22/2005

DOCKETED**DEC 23 2005**

Please find below and/or attached an Office communication concerning this application or proceeding.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Serial Number
10049509

Date Mailed
12/22/05

NOTICE TO FILE CORRECTED APPLICATION PAPERS***Notice of Allowance Mailed***

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 30 days from the mail date of this Notice within which to correct the informalities indicated below. A failure to reply will result in the application being ABANDONED. This period for reply is NOT extendable under 37 CFR 1.136 (a) or (b).

- ♦ Amended claims faxed 6/15/2005 is illegible. Fax missing information to number below or e-mail.
 - For status updates visit <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR System, contact the Electronic Business Center (EBC) toll free at 866-217-9197.

APPLICANT MUST SUPPLY MISSING INFORMATION WITHIN 30 DAYS OF THE MAIL DATE OF THIS NOTICE.

A copy of this notice **MUST** be returned with the reply. Please address response to Commissioner for Patents P.O. Box 1450
Alexandria, VA 22313-1450

A handwritten signature in black ink, appearing to read "Rori Burch", written over a horizontal line.

Rori Burch
USPTO
Publishing Division
Rori.burch@uspto.gov
Fax (703) 746-6830
Fax (703) 308-6642
703-305-0333 ext.135 (V)

06/15/2005 18:21 FAX 2022937860

003/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (canceled).
2. (previously presented): A vehicle running state estimation method comprising:
detecting a vibration level of a portion below a spring of a running vehicle; and
estimating the running state of the vehicle by determining at least one of a condition of a road surface on which the vehicle is running and a running state of each tire,
wherein said determining is based on the detected vibration level, and wherein a waveform of time changes in the vibration level is detected and the condition of the road surface on which the vehicle is running is estimated from a vibration level at a predetermined position of the waveform or for a predetermined time range.
3. (currently amended): The ~~A~~ vehicle running state estimation method according to claim 1, comprising:
detecting a vibration level of a portion below a spring of a running vehicle; wherein a
frequency of the detected vibration level is analyzed to calculate a vibration level at a
predetermined frequency band and a the degree of slipperiness concition of the road surface; on
which the vehicle is running is estimated from ~~by comparing~~ the calculated vibration level, with a

BEST AVAILABLE COPY

06/15/2005 18:21 FAX 2022937860

004/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

master curve which is a vibration level detected through running on a road having a predetermined condition of a road surface of the running vehicle.

4. (currently amended): ~~The A~~ vehicle running state estimation method according to claim 1, comprising:

detecting a vibration level of a portion below a spring of a running vehicle; and

estimating the running state of the vehicle by determining a degree of slipperiness of a road surface on which the vehicle is running and a running state of each tire,

wherein said determining is based on the detected vibration level, and

wherein the frequency of the detected vibration level is analyzed, at least two vibration levels at different frequency bands are calculated, an operation is carried out on the at least two calculated vibration levels, and the degree of slipperiness of the road surface is estimated from computed value.

5. (currently amended): ~~The A~~ vehicle running state estimation method comprising:

detecting a vibration level of a portion below a spring of a running vehicle; and

estimating the running state of the vehicle by determining a condition of a road surface on which the vehicle is running and a running state of each tire,

wherein said determining is based on the detected vibration level, and according to claim

4.

06/15/2005 18:21 FAX 2022937860

005/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

wherein vibration levels of at least two points of a portion below the spring with a buffer member interposed therebetween are detected to calculate a vibration transmission level of the portion below the spring between the two points at a predetermined frequency band; and the degree-of-slipperiness condition of the road surface is estimated from the calculated vibration transmission level.

6. (previously presented): A vehicle running state estimation apparatus for estimating running state of a vehicle based on road surface conditions, the estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle;
means of computing waveform of time changes in the vibration level; and
road surface condition estimation means for estimating a condition of a road surface on which the vehicle is running from the vibration level at a predetermined position of the waveform or for a predetermined time range.

7. (previously presented): The vehicle running state estimation apparatus according to claim 6 further comprising means of calculating the vibration level of at least one of a tire leading edge portion, tire ground contact portion and tire trailing edge portion of the waveform.

8. (currently amended): A vehicle running state estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle;

06/15/2005 18:22 FAX 2022937860

006/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a degree of slipperiness condition of the road surface on which the vehicle is running ~~from by comparing~~ the calculated vibration level with the master curve which is the vibration level detected through running on a road having a predetermined road surface condition.

wherein the running state of the vehicle is estimated based on the degree of slipperiness condition of the road surface received from the road surface condition estimation means.

9. (previously presented): A vehicle running state estimation apparatus comprising:
means of detecting a vibration level of a portion below a spring of a running vehicle; and
road surface condition estimation means for estimating a degree of slipperiness of a road surface from a value obtained by carrying out an operation on at least two vibration levels at different frequency bands by analyzing the frequency of the detected vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means.

10. (currently amended): A vehicle running state estimation apparatus for estimating a running state of a vehicle based on a condition of a road surface comprising:

means of detecting vibration levels of at least two points on a portion below a spring of the running vehicle with a buffer member being interposed therebetween;

06/15/2005 18:22 FAX 2022937860

007/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

means of calculating a vibration transmission level at a predetermined frequency band between said at least two vibration detection points; and

road surface condition estimation means for estimating a degree of slipperiness condition of the road surface on which the vehicle is running from the calculated vibration transmission level.

11. (canceled).

12. (currently amended): The A vehicle running state estimation apparatus according to claim 8, comprising:

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level.

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein a road surface friction coefficient μ at a time of running the vehicle is estimated based on a relationship between a surface friction coefficient μ obtained from braking distances of the vehicle under various road conditions at different speeds and at least one of the calculated

06/15/2005 18:22 FAX 2022937860

008/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

vibration level at said predetermined frequency band and a calculated vibration transmission level.

13. (currently amended): ~~The A~~ vehicle running state estimation apparatus according to ~~claim 8~~, comprising:

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein the frequency band is a band including frequency of natural vibration of a tire tread land portion.

14. (currently amended): ~~The A~~ vehicle running state estimation apparatus according to ~~claim 8~~, comprising:

means of detecting a vibration level of a portion below a spring of a running vehicle;

means of calculating a vibration level at a predetermined frequency band by analyzing frequency of the detected vibration level; and

06/15/2005 18:22 FAX 2022937860

009/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

road surface condition estimation means for estimating a degree of slipperiness of the road surface on which the vehicle is running from the calculated vibration level,

wherein the running state of the vehicle is estimated based on the degree of slipperiness of the road surface received from the road surface condition estimation means, and

wherein a threshold value is set for the vibration level, and the surface of the road is estimated to be in a low friction condition when the calculated vibration level exceeds the threshold value.

15. (previously presented): The vehicle running state estimation apparatus according to claim 14, wherein the threshold value can be changed.

16. (previously presented): The vehicle running state estimation apparatus according to claim 6 which further comprises a vehicle speed detection means to estimate the condition of a road surface based on vehicle speed.

17. (previously presented): The vehicle running state estimation apparatus of claim 6, further comprising:

means of judging slipperiness of the road surface based on the condition of the road surface estimated by the road surface condition estimation means; and

warning means for giving a warning when it is judged that the condition of the road surface is slippery.

06/15/2005 18:23 FAX 2022937860

010/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

18. (previously presented): The vehicle running state estimation apparatus according to claim 17, further comprising:

vehicle speed detection means to change decision on the slipperiness of the road surface and warning level based on vehicle speed.

19. - 24. (canceled).

25. (previously presented): The vehicle running state estimation apparatus according to claim 6, further comprising a transmitter for transmitting output of the vibration detection means for calculating a time change in the vibration level or a vibration level at a predetermined frequency band.

26. (previously presented): The vehicle running state estimation apparatus according to claim 6 further comprising a power generating unit mounted on a tire wheel, wherein the power generating unit generates power by rolling of each tire and supplies power for at least one of driving the vibration detection means and amplifying output of the vibration detection means.

27. (previously presented): A vehicle control apparatus comprising vehicle control means for controlling the running state of a vehicle based on the condition of the road surface estimated by the vehicle running state estimation apparatus of claim 6.

06/15/2005 18:23 FAX 2022937860

011/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

28. (previously presented): The vehicle control apparatus according to claim 27 which comprises vehicle speed detection means to control the running state of the vehicle based on vehicle speed.

29. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls locked state of each wheel.

30. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls attitude of the vehicle.

31. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls air pressure of each tire.

32. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means controls idling state of each wheel.

33. (previously presented): The vehicle control apparatus according to claim 27, wherein the vehicle control means changes inter-vehicle distance set value of an automatic driving system.

06/15/2005 18:23 FAX 2022937860

012/022

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

34. (previously presented): A tire wheel comprising: the vehicle running state estimation apparatus for estimating a running state of the vehicle by detecting the vibration level of the portion below the spring as set forth in claim 6, and a power generating unit for generating power by a rolling of each tire and supplying power to the estimation apparatus.

35. (original): The tire wheel according to claim 34, wherein the vehicle running state estimation apparatus is mounted to the tire wheel.

36. (previously presented): The tire wheel according to claim 34, wherein the power generating unit comprises a rotor magnetized and rotated by the rolling of each tire, a stator made from a high magnetic permeability material and adjacent to the rotor and a power generating coil installed within a magnetic circuit including the rotor and the stator.

37. (original): The tire wheel according to claim 36, wherein the power generating unit comprises means of accumulating electromotive force generated in the power generating coil.

38. (previously presented): The tire wheel according to claim 36, wherein the rotor is turned by rotating an unbalance weight the gravity center of the rotary cone of which is eccentric to a rotary shaft by the rolling of each tire.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 10/049,509

39. (previously presented): The tire wheel according to claim 36, wherein an air stream generated by the rolling of each tire is introduced into the power generating unit and the rotor is turned by the introduced air stream.

40. (new): The vehicle running state estimation method according to claim 3, wherein the master curve is prepared based on the vibration level detected at the time when the vehicle is running on a surface of a road with a usual dry asphalt pavement.

41. (new): The vehicle state estimation apparatus according to claim 8, wherein the master curve is prepared based on the vibration level detected through the running on the surface of a usual road with dry asphalt pavement.